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Whole body means, for purposes of external exposure, head, trunk (including male gonads), arms above the elbow, or legs above the knee.

Working level (WL) is any combination of short-lived radon daughters (for radon-222: polonium-218, lead-214, bismuth-214, and polonium-214; and for radon-220: polonium-216, lead-212, bismuth-212, and polonium-212) in 1 liter of air that will result in the ultimate emission of 1.3×10^5 MeV of potential alpha particle energy.

Working level month (WLM) means an exposure to 1 working level for 170 hours (2,000 working hours per year/12 months per year=approximately 170 hours per month).

Year means the period of time beginning in January used to determine compliance with the provisions of this part. The licensee may change the starting date of the year used to determine compliance by the licensee provided that the change is made at the beginning of the year and that no day is omitted or duplicated in consecutive years.

[56 FR 23391, May 21, 1991, as amended at 57 FR 57878, Dec. 8, 1992; 58 FR 7736, Feb. 9, 1993; 60 FR 36043, July 13, 1995; 60 FR 48625, Sept. 20, 1995; 61 FR 65127, Dec. 10, 1996; 62 FR 4133, Jan. 29, 1997; 62 FR 39087, July 21, 1997; 63 FR 39481, July 23, 1998; 64 FR 54556, Oct. 7, 1999]

EFFECTIVE DATE NOTE: At 64 FR 54556, Oct. 7, 1999, §20.1003 is amended by adding the definitions *Air-purifying respirator*, *Assigned protection factor (APF)*, *Atmosphere-supplying respirator*, *Demand respirator*, *Disposable respirator*, *Filtering facepiece (dust mask)*, *Fit factor*, *Fit test*, *Helmet*, *Hood*, *Loose-fitting facepiece*, *Negative pressure respirator*, *Positive pressure respirator*, *Powered air-purifying respirator (PAPR)*, *Pressure demand respirator*, *Qualitative fit test (QLFT)*, *Quantitative fit test (QNFT)*, *Self-contained breathing apparatus (SCBA)*, *Supplied-air respirator (SAR)* or *airline respirator*, *Tight-fitting facepiece* and *User seal check (fit check)* in alphabetical order, effective Feb. 4, 2000.

§ 20.1004 Units of radiation dose.

(a) Definitions. As used in this part, the units of radiation dose are:

Gray (Gy) is the SI unit of absorbed dose. One gray is equal to an absorbed dose of 1 Joule/kilogram (100 rads).

Rad is the special unit of absorbed dose. One rad is equal to an absorbed dose of 100 ergs/gram or 0.01 joule/kilogram (0.01 gray).

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Rem is the special unit of any of the quantities expressed as dose equivalent. The dose equivalent in rems is equal to the absorbed dose in rads multiplied by the quality factor (1 rem=0.01 sievert).

Sievert is the SI unit of any of the quantities expressed as dose equivalent. The dose equivalent in sieverts is equal to the absorbed dose in grays multiplied by the quality factor (1 Sv=100 rems).

(b) As used in this part, the quality factors for converting absorbed dose to dose equivalent are shown in table 1004(b).1.

TABLE 1004(B).1—QUALITY FACTORS AND ABSORBED DOSE EQUIVALENCIES

| Type of radiation | Quality factor | Absorbed dose equal to a unit dose equivalent ^a |
|--|----------------|--|
| | (Q) | |
| X-, gamma, or beta radiation | 1 | 1 |
| Alpha particles, multiple-charged particles, fission fragments and heavy particles of unknown charge | 20 | 0.05 |
| Neutrons of unknown energy | 10 | 0.1 |
| High-energy protons | 10 | 0.1 |

^a Absorbed dose in rad equal to 1 rem or the absorbed dose in gray equal to 1 sievert.

(c) If it is more convenient to measure the neutron fluence rate than to determine the neutron dose equivalent rate in rems per hour or sieverts per hour, as provided in paragraph (b) of this section, 1 rem (0.01 Sv) of neutron radiation of unknown energies may, for purposes of the regulations in this part, be assumed to result from a total fluence of 25 million neutrons per square centimeter incident upon the body. If sufficient information exists to estimate the approximate energy distribution of the neutrons, the licensee may use the fluence rate per unit dose equivalent or the appropriate Q value from table 1004(b).2 to convert a measured tissue dose in rads to dose equivalent in rems.

TABLE 1004(B).2—MEAN QUALITY FACTORS, Q, AND FLUENCE PER UNIT DOSE EQUIVALENT FOR MONOENERGETIC NEUTRONS

| | Neutron energy (MeV) | Quality factor ^a (Q) | Fluence per unit dose equivalent ^b (neutrons cm ⁻² rem ⁻¹) |
|-----------------|----------------------|---------------------------------|--|
| (thermal) | 2.5×10^{-8} | 2 | 980×10^6 |

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TABLE 1004(B).2—MEAN QUALITY FACTORS, Q, AND FLUENCE PER UNIT DOSE EQUIVALENT FOR MONOENERGETIC NEUTRONS—Continued

| Neutron energy (MeV) | Quality factor ^a (Q) | Fluence per unit dose equivalent ^b (neutrons cm ⁻² rem ⁻¹) |
|----------------------|---------------------------------|--|
| 1×10 ⁻⁷ | 2 | 980×10 ⁶ |
| 1×10 ⁻⁶ | 2 | 810×10 ⁶ |
| 1×10 ⁻⁵ | 2 | 810×10 ⁶ |
| 1×10 ⁻⁴ | 2 | 840×10 ⁶ |
| 1×10 ⁻³ | 2 | 980×10 ⁶ |
| 1×10 ⁻² | 2.5 | 1010×10 ⁶ |
| 1×10 ⁻¹ | 7.5 | 170×10 ⁶ |
| 5×10 ⁻¹ | 11 | 39×10 ⁶ |
| 1 | 11 | 27×10 ⁶ |
| 2.5 | 9 | 29×10 ⁶ |
| 5 | 8 | 23×10 ⁶ |
| 7 | 7 | 24×10 ⁶ |
| 10 | 6.5 | 24×10 ⁶ |
| 14 | 7.5 | 17×10 ⁶ |
| 20 | 8 | 16×10 ⁶ |
| 40 | 7 | 14×10 ⁶ |
| 60 | 5.5 | 16×10 ⁶ |
| 1×10 ² | 4 | 20×10 ⁶ |
| 2×10 ² | 3.5 | 19×10 ⁶ |
| 3×10 ² | 3.5 | 16×10 ⁶ |
| 4×10 ² | 3.5 | 14×10 ⁶ |

^aValue of quality factor (Q) at the point where the dose equivalent is maximum in a 30-cm diameter cylinder tissue-equivalent phantom.

^bMonoenergetic neutrons incident normally on a 30-cm diameter cylinder tissue-equivalent phantom.

§ 20.1005 Units of radioactivity.

For the purposes of this part, activity is expressed in the special unit of curies (Ci) or in the SI unit of becquerels (Bq), or their multiples, or disintegrations (transformations) per unit of time.

(a) One becquerel = 1 disintegration per second (s⁻¹).

(b) One curie = 3.7×10¹⁰ disintegrations per second = 3.7×10¹⁰ becquerels = 2.22×10¹² disintegrations per minute.

[56 FR 23391, May 21, 1991; 56 FR 61352, Dec. 3, 1991]

§ 20.1006 Interpretations.

Except as specifically authorized by the Commission in writing, no interpretation of the meaning of the regulations in this part by an officer or employee of the Commission other than a written interpretation by the General Counsel will be recognized to be binding upon the Commission.

§ 20.1007 Communications.

Unless otherwise specified, communications or reports concerning the regulations in this part should be addressed to the Executive Director for

Operations, U.S. Nuclear Regulatory Commission, Washington, DC 20555. A communication, report, or application may be delivered in person to the Office of the Executive Director for Operations, 11555 Rockville Pike, Rockville, MD 20852.

§ 20.1008 Implementation.

(a) [Reserved]

(b) The applicable section of §§ 20.1001–20.2402 must be used in lieu of requirements in the standards for protection against radiation in effect prior to January 1, 1994¹ that are cited in license conditions or technical specifications, except as specified in paragraphs (c), (d), and (e) of this section. If the requirements of this part are more restrictive than the existing license condition, then the licensee shall comply with this part unless exempted by paragraph (d) of this section.

(c) Any existing license condition or technical specification that is more restrictive than a requirement in §§ 20.1001–20.2402 remains in force until there is a technical specification change, license amendment, or license renewal.

(d) If a license condition or technical specification exempted a licensee from a requirement in the standards for protection against radiation in effect prior to January 1, 1994,¹ it continues to exempt a licensee from the corresponding provision of §§ 20.1001–20.2402.

(e) If a license condition cites provisions in requirements in the standards for protection against radiation in effect prior to January 1, 1994¹ and there are no corresponding provisions in §§ 20.1001–20.2402, then the license condition remains in force until there is a technical specification change, license amendment, or license renewal that modifies or removes this condition.

[59 FR 41643, Aug. 15, 1994]

§ 20.1009 Information collection requirements: OMB approval.

(a) The Nuclear Regulatory Commission has submitted the information collection requirements contained in this part to the Office of Management

¹See §§ 20.1–20.602 codified as of January 1, 1993.